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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/591,035

08/29/2006

Susumu Noda

128698

5887

25944 7590 10/18/2007  
OLIFF & BERRIDGE, PLC  
P.O. BOX 320850  
ALEXANDRIA, VA 22320-4850

EXAMINER

HAGAN, SEAN P

ART UNIT

PAPER NUMBER

2828

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DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/591,035	<b>Applicant(s)</b> NODA ET AL.	
	<b>Examiner</b> Sean Hagan	<b>Art Unit</b> 2828	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 29 August 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |                                                                                        |                                                                   |
|----------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>29 August 2006</u> .                                          | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

1. Claims 1 through 6 originally filed 29 August 2006. Claims 3 through 6 amended by amendment filed 29 August 2006. Claims 1 through 6 are pending in this application.

### ***Specification***

2. Applicant is reminded of the proper language and format for an abstract of the disclosure.

3. The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

4. The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

5. The abstract of the disclosure is objected to because it contains phrases that may be implied. Correction is required. See MPEP § 608.01(b).

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1 through 6 rejected under 35 U.S.C. 103(a) as being unpatentable over Deng et al. (Deng, US Pub. 2003/0235229) in view of Baba et al. (Baba, US Pub. 2005/0089075) and further in view of Noda et al. (Noda, JP Pub. 2000-332351).

8. Noda was part of the IDS received 29 August 2006.

9. ***Regarding claim 1***, Deng discloses, "A two-dimensional photonic crystal having a plate-shaped body material in which a large number of modified refractive index areas whose refractive index differs from that of the body material are periodically arranged" (p. [0026]). "An active layer provided on one side of the two-dimensional photonic crystal" (Fig. 4). Deng does not disclose, "A center of gravity of each modified refractive index area on the side facing the active layer is displaced from that on the side opposite from the active layer." Baba discloses, "A center of gravity of each modified refractive index area on the side facing the active layer is displaced from that on the side opposite from the active layer" (Fig. 7b). It would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Deng with the teachings of Baba. The design of photonic crystal layer so as to cause the center of gravity of each defect to be displaced on one surface relative to the other surface as taught by Baba

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would enhance the teachings of Deng by increasing the probability of light interaction and thus increase scattering loss of higher order mode light (Baba, p. [0100]).

10. The combination of Deng and Baba does not disclose, "A plane shape of each modified refractive index area on a side opposite from the active layer is smaller than that on another side facing the active layer." Noda discloses, "A plane shape of each modified refractive index area on a side opposite from the active layer is smaller than that on another side facing the active layer" (Fig. 5c). It would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of the combination of Deng and Baba with the teachings of Noda. The widening of defects on the side facing the active layer than the opposing side as taught by Noda would enhance the teachings of Deng by altering the transmission characteristics of the photonic crystal layer.

11. **Regarding claim 2**, the combination of Deng and Baba does not disclose, "A cross-sectional shape of the modified refractive index area on a plane perpendicular to the body material has a step- like profile." Noda discloses, "A cross-sectional shape of the modified refractive index area on a plane perpendicular to the body material has a step- like profile" (Fig. 5c). It would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of the combination of Deng and Baba with the teachings of Noda for the reasons given above regarding claim 1.

12. **Regarding claim 3**, Deng does not disclose, "The shape of the modified refractive index area on the side facing the active layer is a triangle." "The shape of the modified refractive index area on the side opposite from the active layer is a triangle that is smaller than the aforementioned triangle." Baba discloses, "The shape of the modified refractive index area on the side facing the active layer is a triangle" (Fig. 7a). "The shape of the modified refractive index area on the side opposite from the active layer is a triangle that is smaller than the aforementioned triangle" (Fig. 7a). It would have been obvious to one of ordinary skill in the art at the time of invention to combine the teachings of Deng with the teachings of Baba for the reasons given above regarding claim 1.

13. **Regarding claim 4**, Deng discloses, "The shape of the modified refractive index area on the side facing the active layer is a circle" (Fig. 1a). The combination of Deng, Baba, and Noda does not disclose, "The shape of the modified refractive index area on the side opposite from the active layer is a shape obtained by partially cutting the aforementioned circle." It would have been an obvious matter of design choice to appropriately design circular defects to taper in such a manner since applicant has not disclosed that this form of tapering, as opposed to tapering done for triangular defects, solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with triangular defects following the teachings of the independent claim.

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14. **Regarding claim 5**, Deng discloses, "The modified refractive index areas are arranged in a square lattice pattern" (Fig. 1a).

15. **Regarding claim 6**, Deng discloses, "The modified refractive index area consists of holes or a member made of a material whose refractive index differs from that of the body material" (p. [0026]).

### **Conclusion**

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sean Hagan whose telephone number is 571-270-1242. The examiner can normally be reached on Monday-Friday 7:30 - 5:00.

17. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun O. Harvey can be reached on 571-272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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18. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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